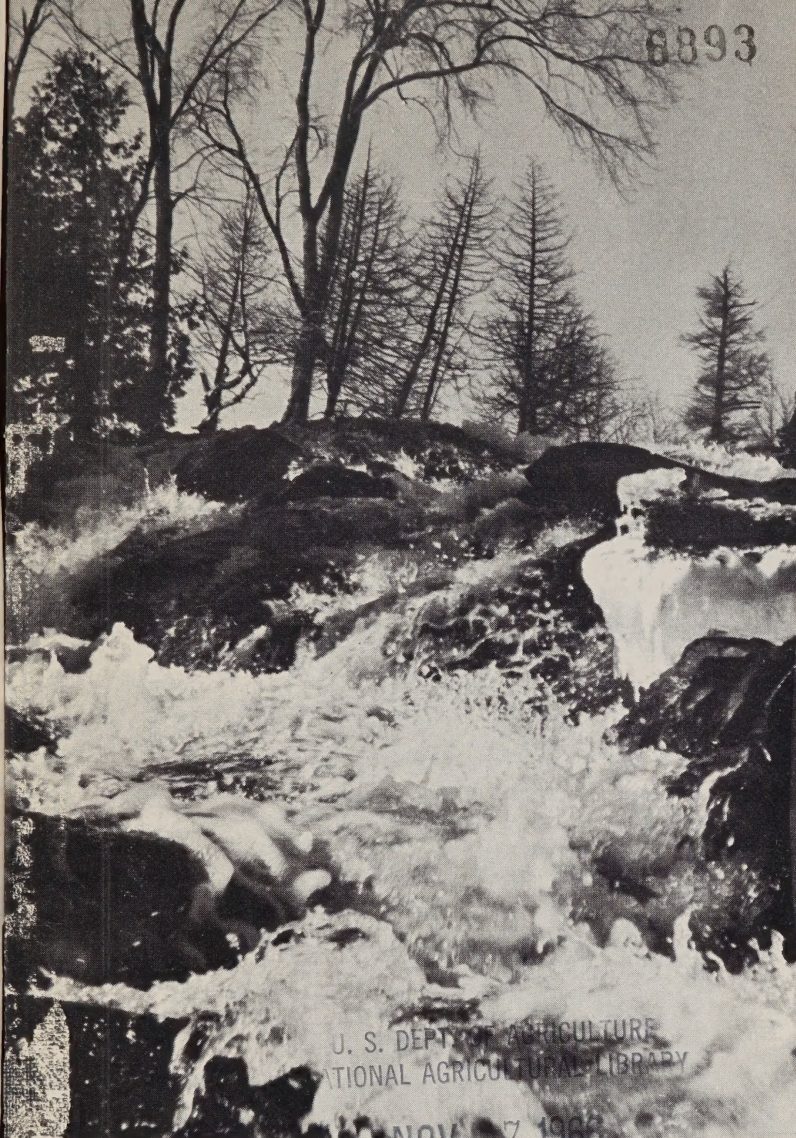


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Watershed Research

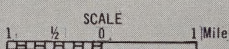
*in Sleepers River Basin
Danville, Vermont*

U. S. DEPARTMENT OF AGRICULTURE



LEGEND

Sub-watershed boundary.....	-----
Stream gaging stations.....	∨
Weather data gathering stations.....	●
Streams.....	~~~~~



Weir Number	Drainage Area
W - 1.....	17 square miles
W - 2.....	146 acres
W - 3.....	3 square miles
W - 4.....	17 square miles
W - 5.....	43 square miles
W - 6.....	168 acres
W - 7.....	8 square miles
W - 8.....	6 square miles
W - 9.....	88 acres
W - 10.....	6 square miles
W - 11.....	600 acres
W - 12.....	500 acres
W - 13.....	254 acres
W - 14.....	1 square mile

Sleepers River Experimental Watershed

199377

Watershed Research

in Sleepers River Basin, Vermont

Water exists in many forms within a watershed—as snow on the mountains, ice on the lakes, liquid in the streams, and vapor in the air overhead. The snow and ice may melt, or the streams may freeze; water vapor may coalesce and fall as rain, or be increased by water evaporated from lakes, streams, vegetation, or snow.

Because of its inconstant nature, water is a difficult resource to study. We know what it is, but we do not know precisely how its behavior is affected by weather, soil conditions, and other factors of its environment.

Achieving this knowledge is the goal of hydrologic researchers at the Sleepers River Basin Research Watershed at Danville, Vt. The project, begun in 1957, is part of an expanding watershed research program conducted by the Agricultural Research Service, U.S. Department of Agriculture.

THE PROJECT SITE

A watershed is the land area from which water drains to a given point. The Sleepers River Watershed consists of 43 square miles of Vermont farmland. It is tributary to the Passumpsic River, and is part of the Connecticut River drainage basin. Its topography is typical of the glaciated uplands which furnish water for the Northeast. Such areas are the headwaters for the streams that carry water to our farms, cities, and industries.

DATA COLLECTION

All of the research at Sleepers River Watershed depends upon collection of basic data. Two types of data-gathering installations are visible at various points on the watershed — weather stations and stream gaging stations.



One of the small stream-gaging weirs in the Sleepers

Weather Stations

There are more than 30 weather stations in the Sleepers River Watershed. They were carefully placed so that data gathered would reflect variations due to elevation and location, and would provide uniform coverage of the entire area.

Each of the weather stations has a continuously recording rain gage and a thermometer that registers the high and low air temperature of the day.

At selected weather stations there are instruments for measuring evaporation, wind velocity and direction, radiant energy, sunshine duration, water temperature, soil temperature, and atmospheric pressure. In all, more than 200 instruments are distributed among the weather stations.

Snow measurements are taken once a week throughout the winter at selected snow courses. The snow depth, the amount of water in the snow, and the snow density are computed for each snow course and for the entire basin. The influence of snow pack and frozen soils on runoff is being studied.

Stream-Gaging Stations

Streams in the major subwatersheds of the project are gaged by V-notch concrete weirs. Adjacent to each weir is a shelter



River watershed; instrument housing is at left.

that houses a continuous depth recorder. As water flows through the notch in the weir, information on depth and rate of flow is recorded by a gaging instrument. This equipment gives an accurate picture of a stream's behavior—its response to runoff from snowmelt and rainfall. Several of the stream-gaging stations are equipped with footbridges. During highwater periods, engineers use these footbridges to collect sediment samples and measure flow with current meters.

In addition to measuring streamflow from the 14 major subwatersheds, researchers are conducting a special study of the more than 60 small feeder streams within one of these subwatersheds.

Subsurface Studies

Water beneath the earth's surface also is studied, although the problems and methods employed differ from the study of surface water. Sleepers River researchers are working on improved techniques for measuring subsurface contribution to streamflow, as well as recharge, storage and discharge of underground water supplies. Equipment used for subsurface research includes an instrument for measuring soil moisture content by the principle of neutron scattering.

Other Studies

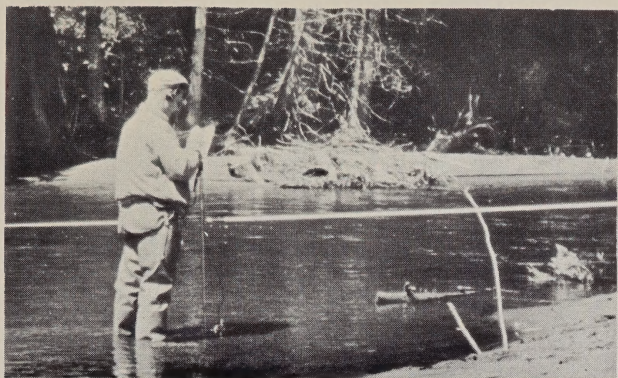
Weather, runoff and subsurface studies give researchers information on the hydrologic cycle—the movement of water from air to earth and back again. A number of other factors must be considered in order to achieve a complete understanding of the watershed. Water supplies are affected by the physical characteristics of an area, such as types and amount of plant cover, slopes, soil texture and underlying rock.

Some information on these physical characteristics is already available to researchers at Sleepers River Watershed. The soils have been mapped and classified by the Soil Conservation Service. The bedrock geology has been determined by the Vermont Geological Survey. Other features, such as stream classification, await completion of detailed surveys.

When this accumulation of data is completed, researchers will have a clear picture of how water affects, and is affected by, a given area. The study will furnish information for a variety of uses. The Soil Conservation Service, for instance, will use the findings to design improved flood-detention dams and other water-control structures. Perhaps the most significant product of the study will be an increased understanding of a resource too often taken for granted.

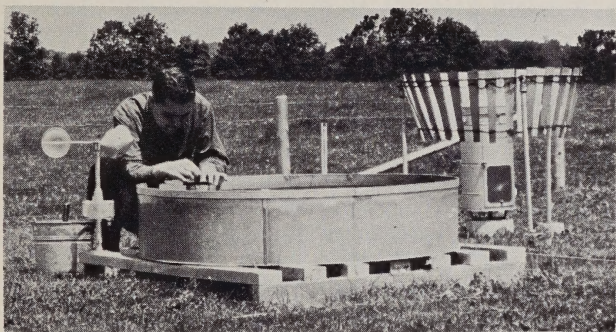
One of the complete meteorological stations located in the Sleepers River Watershed, measuring precipitation, rainfall, temperature, moisture evaporation, snow melt, soil moisture



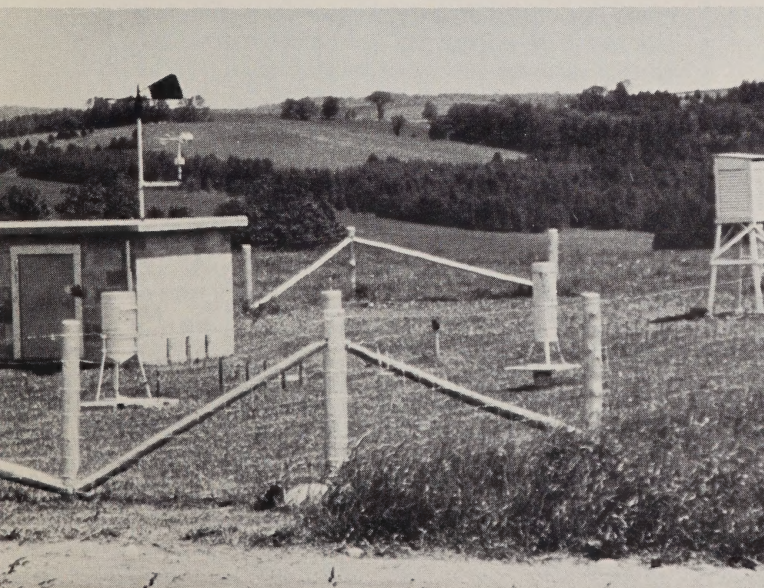


A watershed engineer uses a current meter to determine stream velocity and stream discharge.

A point gage is used to measure evaporation of water.



rs River watershed; instruments measure solar radiation, wind velocity, and moisture.





In winter, technicians traveling by snowmobiles measure depth and water content of snow cover.

Water is essential for crops, jobs, health, and life itself. In the Northeast, people have enjoyed the benefits of a plentiful water supply. The region's prosperity, high living standard, and natural beauty are all dependent upon water supply.

There is no assurance that this water supply is inexhaustible. In 1963 and 1964, wells and reservoirs in some parts of the region went dry following several consecutive summers of below-normal rainfall.

In future years, people in the Northeast will require steadily increasing amounts of water for agricultural production, industry, home use, and recreation: The population of the Northeast, already immense, is growing at the rate of about 600,000 per year. Per capita consumption of water also tends to increase each year.

Will the natural water supply be sufficient to meet this growing demand? Engineers feel the question is too important to be left to speculation. In arid regions, substantial sums are spent to secure and maintain a water supply. In the Northeast, a modest investment in research now will prove invaluable to future users of water.